MATLAB: The New Frontier for EDA Tools

Niraj Shah - January 03, 2005

We're mid-decade of the "New Millennium" and the electronic design automation (EDA) industry still remains uncertain of its growth and, dare I say, pessimistic about its future. I, however, have a much different view and, in fact, believe the EDA industry is on the upswing, driven by new ideas and successful completion of new breakthrough projects. Heretofore, no one has properly described the industry's future or given the industry a look at how it will prevail.

The EDA industry has always had a major shift when a new language is used for designing systems. Recently, much of the EDA community has hyped SystemC, System Verilog, and other so called "Electronic System Level" (ESL) languages as the new frontier. However, none of these candidates have gained traction in the design community. Does this mean system designers are averse to using higher-level languages to describe their system? No!

Many are already using such a language. Consider the signal processing design community: they almost all use MATLAB, a modeling environment from The MathWorks. MATLAB provides three major features to system designers:

1. An intuitive interface that makes it easy for designers to quickly model their designs
2. A library of pre-developed functions
3. Powerful graphing and visualization capabilities that aid in analysis and debugging of signal processing algorithms.

Despite being the de facto standard for signal processing design entry, MATLAB is far from being the next ESL language. It is a very powerful modeling language, but there is currently no automated path to transition algorithms described in M (MATLAB’s language) to an environment more suitable for verification or implementation.

This is where the EDA industry enters. Instead of pushing new languages for system design, we should be creating tools that integrate with designers' existing design flow. The MathWorks has already solved the difficult part of the next frontier of EDA: adoption. Now, all that system designers require are tools to make the M language the "golden model" for system design:

- The ability to easily convert floating-point algorithms to fixed-point within MATLAB
- Fast simulation of MATLAB programs would enable efficient application-level simulations allow designers to make system level trade-offs
- Efficient C-code generation from the M language would enable designers to effectively transition their algorithms to an ASIC or FPGA verification flow and to implementation on a digital signal
A design and verification flow based on these tools will dramatically shorten design time and reduce errors for a variety of implementation targets, including ASICs, FPGAs, and programmable processors.

As we continue to move through this decade and beyond, the EDA industry will respond because the time-honored ritual of identifying designers' problems and solving them will prevail. That's why I'm optimistic that 2005 is the start of something grand.

About the Author

Niraj Shah is a product marketing manager at Catalytic, Inc. in Palo Alto, Calif. He recently received a Ph.D. in electrical engineering and computer sciences from the University of California at Berkeley. His research focused on programming models for application-specific processors. Previously, Shah was a venture partner at ITU Ventures, an early-stage venture capital firm investing in companies emerging from leading research institutions. His email address is niraj@catalyticinc.com.